Fact Sheet

Swine Production Systems

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Pork Production Systems with Business Analyses

Selecting the "Right" System

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The Basic Pork Production Systems

Although production is greatest in the Corn Belt, hogs are being raised profitably in all fifty of our United States—and under many different systems of production, sizes of operation, combinations of facilities and management techniques. And there's no reason to suspect that such diverse production units, if well designed and adapted to the operators' situations, won't continue to "turn a profit." In other words, there is no one "magic" swine production program, but rather there is opportunity for choice.

It would be impossible to describe all the different techniques and facilities being used today in hog production. However, in our opinion, there are eight basic systems that seem to encompass the relevant choices. With only minor adjustments, you should be able to fit one or two of these models to your farm.

Following is an outline of the eight basic pork production systems compared and a brief description of each.

A. Sow herd enterprises
   1. Feeder pig production operations
      a. Low-investment system
      b. High-investment system
   2. Farrow-to-finish operations
      a. One-litter pasture system
      b. Two-litter pasture system
      c. Low-investment confinement system
      d. High-investment confinement system

B. Feeder pig finishing enterprises
      a. Low-investment system
      b. High-investment system

A. Sow Herd Enterprises

This category includes all the systems that maintain a breeding herd and, therefore, have all the problems associated with sow husbandry (i.e., selection, conception, baby-pig mortality, etc.) Another characteristic of sow herd enterprise is lack of production flexibility. For instance, to stop production requires the sacrifice of breeding lines which may have been painstakingly developed; and to start up again is slow and is inefficient in use of facilities.

1. Feeder Pig Production Operations

These produce immature animals (common sale weight, 30-60 lb) which are sold to feeders who then carry them to slaughter weight. Such operations are usually found on farms that do not produce large amounts of grain. Therefore, emphasis is on making full use of a set of buildings and a constant supply of labor rather than trying to "work around" cropping activities. Farrowings are scheduled as frequently as possible, within the limitations of disease control and proper breeding herd management.

a. *Low-Investment System.* These are usually relatively small enterprises (less than 50 sows) designed primarily to supplement rural family earnings by providing a way to gain cash income from the use of available labor and facilities. Low-investment feeder pig production often employs a central farrowing house (many times a converted building or maybe a pull-together building on concrete slab) and an open-sided sow-and-pig nursery. The breeding herd is usually maintained on pasture or dirt lot; and most of the pigs produced are sold in graded, co-mingled sales.

b. *High-Investment System.* This is a feeder pig production "factory" that often maintains 200 sows or more and is operated by full-time swine herdsmen. It employs sophisticated buildings and equipment to reduce labor requirements and provide a controlled environment. Pigs often by-pass the organized feeder markets and move directly to feed-out operations through some contract or base-pricing arrangement. This avoids certain selling costs and the dangers of spreading disease among "pooled" pigs.

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2. Farrow-to-Finish Operations

These are the systems that produce pigs and carry them to market weight (around 200-240 lb.).

a. *One-Litter Pasture System.* Under this program, gilts are farrowed once, then marketed; all pigs are raised and sold as market hogs, except for a new group of gilts, which is saved back to continue the production cycle. The system makes good use of fenced cropland that is farmed in rotation, and building and equipment investments are minimal. However, it does have some high-risk aspects with regard to animal performance and product price. For instance, predators and weather pose a constant threat to young animals; and since each year's crop is sold in one short period, there is always the danger of a depressed market. Therefore, a 1-litter system does not normally stand alone, but needs supporting enterprises to provide income when it fails.

b. *Two-Litter Pasture System.* This pasture system is suited to one who cannot or will not make a long-run commitment to hog production but needs a livestock enterprise to add business volume or utilize "salvage resources." It operates on a 6-month cycle, with sows farrowing in late winter and late summer. These farrowings can be scheduled to utilize labor that is available during periods of little crop production activity. Two essentials to success, however, are: cropland suitable for hog pasture, and herdsmanship skills sufficient to insure satisfactory performance.

c. *Low-Investment, Low-Intensity Confinement System.* With this system, hog production is usually a secondary enterprise to cropping and employs excess seasonal labor and other under- or un-used resources, such as waste feed, buildings, fence and materials-handling equipment. Buildings are simple in design with a minimum of environmental control and labor-saving devices. Farrowings are usually scheduled to avoid the peak labor periods for crop production. A popular 4-times-a-year farrowing sequence is December and February, June and August. Although the sow herd may glean grain fields and graze available pasture, this confinement system does not keep good land out of crop production.

d. *High-Investment, High-Intensity Confinement System.* Characteristic of this confinement system are specialized buildings and rather sophisticated equipment, including self-cleaning floors (slatted or flushed), liquid manure handling, automatic ventilation and automatic feed distribution. Even on farms where crop production activities compete for available labor, making full use of the hog facilities takes precedent. Farrowings are frequent (at least 6 times a year) and at regular intervals. High-intensity farrow-to-finish is very confining unless the unit is large enough to justify 2 or more operators. Being a confinement system, it frees the land for crop production.

B. Feeder Pig Finishing Enterprises

This category includes those systems where young pigs (usually 30-60 lb.) are purchased and fed to market weight. Finishing enterprises require rather large sums of operating capital and involve considerable financial risk.

However, compared to sow herd enterprises, they provide more opportunity to vary production in response to expected profit levels. The "penalty" from halting production is relatively modest, since the operator can completely restock on short notice.

Successful feeder pig finishers tend to be: (1) short on labor and husbandry skills needed to manage a sow herd, but long on feed grain to market through livestock, (2) skilled in buying and selling, and willing to invest sufficient time to keep on top of the markets, and (3) able to withstand periods of financial loss or to somehow "insure" against such losses.

a. *Low-Investment System.* This system uses simple open-fronted buildings with exposed concrete slabs or dirt lots. Building investments are low, but the "penalties" are higher labor requirements and increased problems with flies, odors and waste disposal. For the producer who plans to buy pigs on the open-market, this system does provide the flexibility to "shut-down" when there is little chance for profit.

b. *High-Investment System.* Sophisticated buildings and equipment are used to reduce labor requirements and provide a controlled environment. However, management is under considerable pressure to utilize facilities to capacity, since the high cost of owning them goes on whether or not they are in use. Many using this system either buy on a continuing basis directly from feeder pig producers or are share-holders in feeder pig co-ops. These single sources of relatively disease-free pigs can permit an intensity of operation that keeps building costs per pig within bounds.

How the Systems Will Be Compared

In the following three sections, we will attempt to compare the eight basic systems of hog production according to: (1) their appropriateness (or "fit") in light of size and characteristics of the farm and the organization, skills and capital position of ownership and management; (2) their capital, labor and feed requirements; and (3) their anticipated profitability and optimum volume. None of these aspects can be ignored if the producer wants a true picture of how each system would perform on his farm.

Where Each System Best 'Fits'

Table 1 summarizes the relative compatibility between systems of hog production and various resource situations that exist on any given farm. An "X" indicates that the system at the top of the column *fits* the resource situation listed on the left. A blank means lack of compatibility.

To determine the system or systems most appropriate for you, read Table 1 as follows:

- First, underline all the resource situations on the left that describe or apply to your farm business.
- Next, identify the 2 or 3 production systems that appear most compatible with that farm business resources description (i.e., the systems with the most X's associated with the resource situations you underlined).
- Then, evaluate each system selected to determine if there are any X'd resource situations essential to the success of that system but lacking on your farm (i.e., not underlined). This should narrow your alternatives to the 1 or 2 systems that warrant further investigation.

The following paragraphs discuss the 5 resource situation categories listed in Table 1 and their probable effects on the various production systems. However, since readers will define and interpret differently the items under each category, a mere yes/no rating scheme for predicting hog system "success" on a given farm greatly over-simplifies the matter. Therefore, you are encouraged to carefully assess the importance of our go-ahead signal ("X") and the seriousness of our warning blank as they apply to your business.

Farm Size and Type (A)

All systems, except producing feeder pigs, fit on large grain farms. If the land is highly productive (flat and black), pasture systems become inappropriate because of the sacrifice in crop earnings to make pasture available. In addition, such land is often unfit for a pasture system because of mud.

Because a low-investment confinement system is usually short on manure storage capacity, it doesn't fit on farms where every acre can be in row crops; but rather

Table 1. Compatibility of Various Pork Production Systems to Given Resource Situations.

Resource situation	Sow herd enterprises						Feeder pig finishing enterprises	
	Feeder pig production operations		Farrow-to-finish operations					
	Low invest. system	High invest. system	One litter pasture system	Two litter pasture system	Low invest. confine. system	High invest. confine. system	Low invest. system	High invest. system
A. Farm size and type								
1. Large grain farm			X	X	X	X	X	X
a. Is flat and black						X		X
b. Should be farmed in a rotation			X	X	X		X	
c. Is fenced			X	X				
2. Small acreage farm	X							
B. The management								
1. Short on hog production experience	X		X	X	X		X	
2. Wants to avoid risk	X			X	X			
3. Is better than average at:								
a. Buying and selling		X				X	X	X
b. Husbandry	X	X	X	X	X	X		
c. Mechanical work		X				X		X
d. Production scheduling and management		X				X		
e. Supervising labor	X	X			X	X	X	X
C. Capital position								
1. Is well capitalized and —		X	X	X	X	X	X	X
a. Willing to make long-term capital commitment		X				X		X
b. Can stand substantial short-term losses							X	X
2. Is short on capital	X		X	X	X		X	
3. Needs steady income flow	X	X				X		
4. Has older buildings available	X				X		X	
D. Labor supply								
1. Varies seasonally			X	X	X		X	
2. Is constant but limited	X	X				X	X	X
3. Can involve housewife	X	X						
4. Will hire necessary full-time help		X				X		X
E. Business organization								
1. Landlord-tenant			X	X	X		X	
2. Owner-operator								
a. Hog enterprise short-term (to be phased out)	X		X	X	X		X	
b. Hog enterprise long-term (sons coming into business)		X				X	X	X
3. Hog producing corporation		X				X		X

*An "X" indicates that the system at the top of the column *fits* the resource situation on the left. A blank means lack of compatibility

should be on farms with land in rotation so there is always acreage for manure spreading.

With permanent, hog-tight fence costing approximately $10 per rod, fencing land for hogs can range up to $250 per acre depending on lot size, terrain, etc. If the farm is already fenced, pasture systems will be relatively attractive.

Most appropriate for small acreage farms is low-investment feeder pig production. However, there is increasing interest in establishing high-investment pork production "factories" on small acreage. However, enough land should be owned or otherwise controlled around any hog enterprise to permit efficient manure spreading and minimize the risk of offending neighbors.

The Management (B)

Table 1 warns operators short on hog production experience against high-investment, high-intensity production facilities.

Operators who cannot tolerate risk are likewise cautioned away both from the 1-litter system because of problems with weather and predators, and from high-investment facilities, which imply big volume and dangers of disease, obsolescence and poor markets. And unless covered by some kind of "price insurance," risk-avoiders are especially cautioned against feeder pig finishing, which is characterized by wide swings in profitability.

Certain systems also call for high levels of special management skill. For instance:

1. The feeder of purchased pigs should have an especially high level of skills in the market-place.

2. The sow herd operator needs a higher level of husbandry skill than does the feeder pig finisher.

3. The sophisticated automation devices employed in high-investment facilities require considerable mechanical skill to keep them working.

4. High-intensity sow herd operations require careful scheduling and diligence in adhering to a tight production calendar.

5. And a number of systems require skill in supervising labor, as in the cases of (a) high-investment operations that encourage large volume production and therefore are often designed to employ 2 or more men, or (b) low-investment confinement that uses large quantities of labor for manure scraping, sow handling, etc.

Capital Position(C)

Any of the systems except low-investment feeder pig production might be appropriate on a well-capitalized farm (i.e., cash is available for investment, or equity in the business will support borrowing). The operator of such a farm who is willing to make long-term investments should give serious thought to the high-investment systems. However, if he is not in a position to stand substantial short-term losses, he certainly should avoid the feeding out of purchased pigs.

For those short of capital, any of the pasture or low-investment confinement systems might be appropriate as long as facilities are not over-crowded and good performance levels can be maintained. Low-investment feeder pig finishing can also fit a capital-short operator, provided he can obtain protection through some sort of no-loss contract.

A steady flow of income—like a dairy enterprise—can be achieved by regular and frequent farrowings. Many operators who farrow every other month send animals to market each week. Table 1 identifies the three systems that encourage frequent farrowing.

A steady income can also be achieved with feeder pig finishing systems. But risk of disease is so great that income flow should probably be sacrificed to all-in, all-out management. The exception would be where a finisher has a dependable, adequate supply of healthy pigs from a single source.

If sound, older buildings are available, they probably should be used if animals perform well in them. Cost of providing new high-investment farrow-to-finish facilities is approximately $6 per hundredweight of gain, whereas older buildings are often "free." If so, they will almost certainly result in lower production costs than would new buildings.

Labor Supply (D)

A supply of labor that varies from month to month (e.g., a crop producer with hogs as a secondary enterprise) encourages use of those systems that permit flexibility in scheduling. A high-investment system doesn't have this flexibility because of the need to cut facility costs per pig by making use of every square foot every day. Neither does low-investment feeder pig production because of the need, in most cases, for a steady income flow.

An operator with a constant labor supply from month to month (e.g., a factory-worker using a hog enterprise to supplement his income) should avoid systems that are seasonal in labor demands, such as pasture systems and certain low-investment confinement where the buildings don't permit satisfactory animal performance in extreme cold or hot weather.

Many women are excellent farrowing-house managers. Often a feeder pig enterprise with a relatively constant labor need can provide a part-time job for a housewife without her having to leave home.

A hog business large enough to employ full-time help should use a production system that has a relatively constant day-to-day and month-to-month labor requirement, so the labor force can be used efficiently. It should also be one that will attract competent help and generate enough income to pay competitive wages. High-investment confinement best fits these criteria.

Business Organization (E)

High-investment systems are not often found on tenant-operated farms. It is difficult for a landlord to justify investing in sophisticated facilities for two reasons: (1) since the typical lease is written for only one year, the landlord has no assurance of continued high-level management; and (2) in spite of the fact that, with high-investment technology, the landlord's capital replaces the tenant's labor, the bonds of tradition in tenancy arrangements make it difficult to write compensating adjustments into a lease.

Low-investment feeder pig production is also rather rare on tenant-operated farms, because of the high labor input and unwillingness of skilled operators to share returns with a landlord.

Any of the 8 hog production systems might fit an owner-operator. However, there are certain times in the life of a business when investment in such long-lived assets as buildings would be more appropriate. For instance, when a son enters the business, continuity of management is fairly well assured. However, two questions must always be asked: (1) "How long will it take the investment to pay off?" and (2) "How long do the present operators expect to continue farming?"

If the pay-off period is longer than the remaining active farming life of the operator, it would seem wise to consider only those systems designed to use up existing resources—or, at least, to ask a hard third question: "Does the investment fit the farm?" In other words, if the farm were sold before the system paid out, would the improvement add more than its remaining cost?

A corporation provides for continuation of the enterprise beyond the life-span of a single individual. Therefore, the corporate structure is well suited to high-investment systems, even though there may be concern about the ability of such organizations to attract and keep skilled management.

Comparing the Systems—Capital, Labor and Feed Requirements

Capital Requirements

Starting in the hog business requires a good deal of capital regardless of the production system you choose. However, the number of investment dollars needed, length of the start-up period and cost of owning facilities all differ greatly from system to system.

Table 2 shows the amount of capital required for each of our 8 basic swine systems. It estimates the cost of buildings and equipment, and the start-up expenses (including breeding stock) to establish from "scratch" a pork production system on bare land.

Another fact sheet in this series, *Capital Requirements for Pork Production* (PIH-49), provides a detailed analysis of these investment needs, including land. Other fact sheets describe various systems and provide detailed lists of the building and equipment items, which are the basis for the figures in column 1 of Table 2. They also contain projected cash-flow statements for a start-up situation, which are the basis for the figures in column 2.

Column 4 of Table 2 estimates the capital investment required for each system to provide a job for a full-time employee. The figures are arrived at by: dividing 3000 (assumed annual working hours for full-time employment) by total *labor* requirement per unit of production (Table 3, col. 2); then multiplying that answer by total *capital* requirement per unit of production.The results, therefore, are influenced by the labor efficiency of the system as well as its per-unit capital needs.

The final column in Table 2—cost of facilities—attempts to answer the question, "How much rent must be paid for use of buildings and equipment?" The figures represent the returns which the investor must have to cover taxes and insurance, to provide maintenance, to pay a competitive interest rate on the money tied up in the investment, and to permit set-aside funds (depreciation) so his capital will be intact at the end of the useful life of the facilities. (Useful life is assumed to be 15 years for the shells of permanent buildings and 8 years for equipment and portable buildings). The data are presented on a per-pig basis for feeder pig producers, and on a per-hundredweight-of-gain basis for market hog producers, because this is the way they are most likely to calculate their costs.

Table 2 shows that to establish a modern high investment confinement farrow-to-finish hog production plant on an existing farm, approximately $1,510 is required for each productive sow in the breeding herd. If 14-16 market hogs are produced annually from a sow unit, investment per pig produced per year will be $1,510÷15 or about $100.

This is the total dollar investment (for facilities and development of a normal inventory) which must be made before the enterprise begins to generate money. In addition, length of time to the first pay-day is substantial—approximately 12 months for a farrow-to-finish unit, 8 months to produce feeder pigs and 4 or 5 months for feeder pig finishing.

Table 2 also reveals the following concerning investment requirements of the various systems:

- Feeder pig finishing tends to have the greatest capital demand and feeder pig production the least, with farrow-to-finish intermediate.
- High-investment, high-intensity systems are about double the capital requirement per man compared to low-investment systems.
- High-investment facility costs per unit of production are 60-100 % more than for low-investment. (Risk is also increased because this fixed cost per unit can "explode"—both in the short run if facilities are not fully utilized because of disease or liquidation, and over the life of the facilities if obsolescence, poor design or business failure should significantly shorten that life.)

Labor Requirements

One of the important consequences of high-investment technology for pork production is that labor needs are reduced through the use of slatted floors and mechanical devices for environmental control and materials handling. Labor input for the same system will vary greatly from one farm to another, depending on planning, layout of facilities, workmanship standards set by management, and the energy and motivation of the workers.

The data in Table 3 on labor requirements, costs and per-man productivity are intended to represent the *average* situation; figures from individual farms will probably range 30 % above and below those in the table.

The first two columns in the table are estimates of labor required by the various systems, expressed as hours per unit of production. "Direct labor" is that time involved directly in hog production; use these figures to estimate extra labor needs when planning to add to an existing pork production system. "Total labor" includes the time required for planning, keeping records, paying taxes, maintaining the farmstead and attending to other "overhead" items that are part of running a farm business.

The final two columns are estimates of the number of hogs that can be produced with 300 days of labor (1 man-equivalent). Again, these data are based on only the labor involved directly in hog production (col. 1).

Table 3 shows that use of high-investment, labor-sparing technology reduces labor cost (col. 3). However, a more important and subtle pay-off is demonstrated in the last two columns. Most pork producers design their systems to employ a supply of available labor. Thus, output is often set by the size of the labor force. Since high-investment systems dramatically increase output per man,

Table 2. Capital Requirements, Investment per Full-Time Employee and Facility Costs for Various Pork Production Systems.

Production system	Investment per unit of production[a/]			Capital to employ full-time man[d/]	Cost of facilities
	Buildings and equipment[b/]	Start-up expenses[c/]	Total investment		
A. Sow herd enterprises		per sow unit[a/]			per pig
1. Feeder pig production operations					
a. Low investment system	$ 345	$ 235	$ 580	$ 67,000	$4.20
b. High investment system	660	235	895	149,000	8.00
2. Farrow-to-finish operations					per cwt. gain
a. One litter pasture system[e/]	$ 285	$ 305	$ 590	$111,000	$3.75
b. Two litter pasture system	765	580	1345	84,000	4.40
c. Low investment confinement system	630	480	1110	74,000	3.45
d. High investment confinement system	1085	425	1510	162,000	6.00
B. Feeder pig finishing enterprises		per 100 purchased pigs[a/]			
a. Low investment system	$1985	$2050	$4035	$121,000	$2.20
b. High investment system	3200	2100	5300	199,000	3.50

a/ The *sow* is the unit for sow herd enterprise data; it denotes a mature female in production and includes a "supporting cast" of boars, replacement gilts and progeny in various stages of growth, with 14-16 market hogs sold yearly per sow unit. The unit for feeder pig finishing enterprises is *100 purchased pigs;* it assumes that feeders are fed on a continuous basis, and for each 100 pigs fed out per year, only about 1/3 are on hand at any one time.

b/ Estimated 1975 new cost per unit of production assuming the following building and equipment use intensity: for feeder pig production, farrow 6 times/year; for farrow-to-finish, farrow 6 times/year with high investment, 4 times a year with low investment, and 2 times/year with 2-litter pasture; for feeding purchased pigs, assume 3 groups/year fed in a set of facilities.

c/ Represents greatest negative cash-flow in a start-up situation and includes cost of breeding stock for sow herd enterprises and cost of young pigs for feeder pig finishing enterprises.

d/ A full-time man is assumed to work the equivalent of 300 ten-hour days per year.

e/ The cycle is 12 months, with the breeding herd made up entirely of gilts farrowing once a year in spring or early summer.

Table 3. Labor Requirements and Costs, and Per-man Capacity for Various Pork Production Systems.

Production system	Hours of labor per unit of production[a] Direct	Total	Labor cost[b]	Production per man: Size of sow herd	Production per man: Pigs per year
A. Sow herd enterprises	per sow unit[a]		per pig	number	
1. Feeder pig production operations					
a. Low investment system	20	26	$4.52	150	2250
b. High investment system	14	18	3.16	215	3200
2. Farrow-to-finish operations			per cwt. gain		
a. One litter pasture system	12	16	$2.59	250	1675
b. Two litter pasture system	36	48	3.69	85	1250
c. Low investment confinement system	34	45	3.49	90	1300
d. High investment confinement system	22	28	2.27	135	2050
B. Feeder pig finishing enterprises	per 100 pigs[a]				
a. Low investment system	75	100	$1.60	—	4000
b. High investment system	60	80	1.29	—	5000

a/ Units of production in discussing labor requirements are the *sow* for sow herd enterprises and *100 purchased pigs* for feeder pig finishing enterprises (see Table 2, footnote a.).
b/ Labor is charged at $3.50 per hour.

they also usually result in greater production per farm. Thus, if pork production is profitable, there are more units on which to make a profit.

Besides variation from system to system in the quantity of labor needed, there may also be a big quality difference. Here are examples on which there would be general agreement:

- Pasture and low-investment confinement systems tend to require hard physical labor and expose the operator to mud, manure and inclement weather.
- High investment systems that use slatted floors and handle manure as a liquid virtually eliminate "scoop-shovel" labor; but the work is confining and odors may be obnoxious.
- Pasture systems provide a margin for error in that availability of space and green vegetation permits the operator to be less timely and precise and still avoid problems with nutrition, cannibalism and disease.
- As intensity of production increases, so does the required level of technical skill. Operators of high-investment, high-intensity systems need to be skilled in production scheduling, use of medications, building and equipment repair, etc.

Feed Requirements

Feed makes up about half the total cost for a feeder pig producer, about 60% for a farrow-to-finish operator and about 2/3 the total cost for a feeder pig finisher.

Table 4 presents feed requirement and feed conversion data for the 8 basic production systems. Because feed conversion reflects disease, mortality, feed wastage, conception rates, litter size, etc., it is the best overall measure of animal performance and enterprise efficiency. The levels of performance shown in the tables are practical goals; that is, competent producers should strive to improve upon these standards.

The feed requirement data in Table 4 are broken into two categories—feed grain (corn equivalent) and purchased feed (supplement and creep). If using a feed grain other than corn, calculate the requirements on the basis of these conversions: 1 bu. (56 lb.) of corn equals 2 bu. of oats, or .9 bu. of wheat or 1.1 bu. of barley. The purchased feed figures are based on the use of commercial 40% protein supplement. (The total would not be affected significantly if protein, minerals and vitamins were purchased separately.)

Feed conversion is calculated as total pounds of feed fed divided by total hundredweight of pork produced. For sow herd enterprises, weight gains in the breeding herd are taken into account. In finishing enterprises, only feedlot gains are considered.

For sow herd enterprises (Table 4), the data include gestation and lactation feed as well as an allowance for boars and for bringing replacement gilts to breeding age. All female breeding herd replacements are assumed to come from within the herd.

Table 4 shows that feed conversion is relatively poor in the breeding herd, as reflected in the figures for the feeder pig production systems. Best conversions are achieved when there is no sow herd (finishing enterprises) or when sow productivity is high (high-investment farrow-to-finish).

In addition to variation in amounts of feed required from system to system, there are also likely to be these quality differences:

- High-investment, high-intensity confinement systems call for maximum control over ration formulation, so the operator can quickly change levels of medication or other feed additives if problems arise. He also needs feedstuffs that won't cause problems in an automated feeding system. This leads to use of complete mixed rations in either meal or pellet form.
- Pasture systems that provide high-quality legume forage can significantly reduce the bill for purchased supplement. Costs of shelling, grinding, feed storage and handling may also be minimized.
- The 1-litter system often provides for "hogging down" of a share of the corn crop. Hogs can be turned into the corn fields in early September, thereby avoiding harvesting and drying costs on as much as 1/3 of their corn requirement.

Comparing the Systems— Profitability and Optimum Size

Potential Profitability

Table 5 compares profit potential of the various pork production systems. Two measures of profit have been

Table 4. Feed Requirements and Feed Conversion Rates for Various Pork Production Systems.

Production system	Feed per unit of production[a/]		Feed conversion
	Bu. of corn equivalent	Lbs. of purchased feed	Lbs. feed per cwt. produced
A. Sow herd enterprises	per sow unit[a/]		per cwt. gain
1. Feeder pig production operations			
a. Low investment system	60	1130	474
b. High investment system	56	1165	453
2. Farrow-to-finish operations			
a. One litter pasture system	100	1050	410
b. Two litter pasture system	202	2350	400
c. Low investment confinement system	203	2495	406
d. High investment confinement system	197	2550	400
B. Feeder pig finishing enterprises	per 100 purchased pigs[a/]		
a. Low investment system	960	10,650	394
b. High investment system	930	10,400	382

a/ Units of production in discussing feed requirements are the *sow* for sow herd enterprises and *100 purchased pigs* for feeder pig finishing enterprises (see Table 2, footnote a.).

Table 5. Rate Earned on Investment and Dollar Return to Labor for Various Pork Production Systems.

Production system	Rate earned on investment	Return per hour of labor
A. Sow herd enterprises		
1. Feeder pig production operations		
a. Low investment system	6.6%	$3.17
b. High investment system	9.5	3.65
2. Farrow-to-finish operations		
a. One litter pasture system	14.5%	5.00
b. Two litter pasture system	12.0	3.97
c. Low investment confinement system	19.5	5.19
d. High investment confinement system	15.8	5.80
B. Feeder pig finishing enterprises		
a. Low investment system	11.3%	4.07
b. High investment system	10.4	4.06

calculated in order to distinguish the return to capital from return to labor.

Rate earned on investment is the percent return on capital invested in the enterprise after all expenses have been paid, including a wage of $3.50 per hour. *Returns per hour of labor* is the dollar return per hour after all expenses have been paid, including a 9 % interest charge on the money invested in the enterprise.

Profitability is highly variable from farm to farm and from year to year. Therefore, Table 5 is not intended to predict the profitability of any particular producer, but merely to present a comparison of the *relative* profitability of various systems.

The calculations are based on what were judged to be (in 1975) conservative price forecasts and "normal" price relationships—i.e., $34 hogs, $2-per-bushel corn, $200-per-ton supplement and $3.50-per-hour labor. These price assumptions were held constant across all systems except one. In the 1-litter system, market hog prices were discounted approximately 5%, because sales are made in November and December when prices usually are at seasonal lows.

Table 5 shows that farrow-to-finish enterprises tend to be more profitable than feeder pig production or feeder pig finishing. One reason is that, with farrow-to-finish, cost of transferring pigs (transportation, commission, yardage, etc.) from one farm to another is avoided—an expense that averages $2 per pig.

There are also other subtle penalties to systems that "split the enterprise"—(1) increased medication and mortality, (2) slower progress in improving the performance and carcass merit of animals, and (3) inefficiencies in building usage from all-in, all-out scheduling.

Determining Optimum Size

Best competitive size for a hog production enterprise is determined by the system chosen. Table 6 indicates the minimum size for each of the 8 systems to be competitive. It also provides an estimate of the practical upper limit on size, which is based on actual farms that have operated

Table 6. Minimum Competitive Size and Feasible Maximums for Various Pork Production Systems.

Production system	Minimum competitive size		Feasible goal	
	Number of sows	Pigs produced per year	Number of sows	Pigs produced per year
A. Sow herd enterprises				
1. Feeder pig production operations				
a. Low investment system	36	540	150	2250
b. High investment system	100	1500	400	6000
2. Farrow-to-finish operations				
a. One litter pasture system	50	335	600	4000
b. Two litter pasture system	25	375	150	2250
c. Low investment confinement system	60	900	150	2250
d. High investment confinement system	100	1500	400	6000
B. Feeder pig finishing enterprises				
a. Low investment system	—	600	—	5000
b. High investment system	—	1500	—	15,000

successfully at these "feasible goal" levels for several years, through good times and bad.

The "minimum competitive size" is merely a guideline for those planning to establish new enterprises. This does not mean that smaller units can't add to farm earnings; for indeed, many pork production enterprises exist primarily to use up some available resource, such as labor, buildings or fenced pasture land. If any of these resources have no alternative use, then they are "free" inputs to pork production. When this is the situation, size of the enterprise is set by the limiting resource, and such an operation can be very small indeed and still contribute to earnings.

New enterprises, however, must have sufficient volume to make efficient use of labor, buildings, equipment, etc. They also need to be big enough that production inputs can be purchased and the product marketed at competitive prices; rather than through small-lot, high-cost retailers or "jockeys."

For instance, Table 6 indicates that high-investment farrow-to-finish should have at least 100 sows producing about 1,500 market hogs per year. The supporting equipment (e.g., honey wagon, automatic feed processing, stand-by generator) and the environmentally controlled buildings can be justified only with volume and intensive use.

Summary

If you are already a pork producer, it is hoped this publication has helped you determine whether your current production system warrants continued emphasis, because it fits your resource base and your goals.

If you are planning to enter the hog business or considering a major change in your present operation, this publication should have helped identify the 1 or 2 systems that deserve further investigation.

The next step is to turn to the specific publication in this series that details the production system most relevant to your situation. It will guide you in preparing a production-management calendar, list of capital requirements, a budget and a cash-flow projection to analyze the system more completely.

If, after preparing and studying those reports, the particular production system still looks profitable and workable, then one final test should be taken. Before investing any money, invest some time in visiting several pork producers who use the system you are considering. Find out what each operator likes about it, what he considers to be important to success, and what his problems are. Then check with your state Extension Service for help in planning the changes you should make.

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